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ABSTRACT

A project has been initiated to develop educational games for teaching cognitive skills to Head Start children. It is hypothesized that while a game format may be less efficient and less effective than conventional methods for the teaching of specific skills, the use of games in the curriculum will lead to significant improvement in attitude toward intellectual tasks and will minimize the need for constant supervision. This paper reports on a pilot study whose goal was to create a game what would teach children a listening comprehension of four linguistic constructions: conjunction, negation, joint denial, and exclusion. It was hypothesized that after playing the game, children would show improvement in their comprehension of spoken sentences using these constructions. In addition, children were expected to find the game enjoyable. The subjects, eight Head Start children from 4 years 3 months to 5 years old, were pre- and posttested with four game sessions intervening. Gains in posttest scores supported belief in the general effectiveness of the game for teaching the four linguistic constructions. Although there was no objective measure of the children's attitudes, they enjoyed the game and asked to play again, which seems to indicate that the game approach is appropriate for teaching tasks not intrinsically interesting. (MH)

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AN EXPERIMENTAL GAME IN ORAL LANGUAGE COMPREHENSION

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AN EXPERIMENTAL GAME IN ORAL LANGUAGE COMPREHENSION

This paper reports a pilot study in connection with a project for the development of educational games for teaching cognitive skills to young children in Head Start classes. The project is based on the hypothesis that while the game format may be less efficient in time or less effective in developing specific skills than conventional teaching methods, the use of games in the curriculum will contribute more to the development of positive attitudes toward intellectual tasks. In addition, educational games which children can play on their own or with minimum supervision will give children the opportunity to learn even when the teacher is busy elsewhere.

With a vast array of games available today, there is a corresponding lack of evidence regarding their effectiveness. While it is claimed that such games produce both cognitive and affective learning, no comparative experimental studies are available to substantiate the value of games with young children. The goal of this pilot study was first to create a game to teach certain language skills and then to obtain empirical evidence as to how effectively it taught certain concepts, compared to an alternative programmed format. Informal evidence was sought with respect to such questions as appropriate learning objectives and methods of reinforcement, amount of supervision required, and optimum playing conditions for young children.

The game was devised to teach children a listening comprehension of four linguistic constructions: conjunction, negation, joint denial, and exclusion. It was hypothesized that after playing the game, children would show improvement in their comprehension of spoken sentences using these linguistic constructions. It was further hypothesized that

that the children would enjoy the game, as evidenced by facial expressions and verbal expressions of approval. In addition, general observations were made about variables in the playing conditions, to throw light on the following questions: How well could children follow the directions? How well could they handle the materials? How much supervision was required? What was the optimum length of time for each daily play period and how often could the game be repeated without boredom?

Method

Experimental materials: The game

The game is played by three children at a time, under the direction of an adult (the experimenter). Each child is presented with an identical set of six different cards, each card showing a boy or a girl with a variety of attributes: (1) with or without shoes; (2) with or without hat; (3) with a pet dog or a car; (4) with or without a ball (see Fig. 1). The child is required to pick the correct card described by a defining sentence read by the experimenter. Examples of defining sentences using each of the four linguistic constructions are as follows:

Conjunction: Find the girl with a hat and shoes.

Negation: Find the boy with no ball.

Joint denial: Find the boy with no shoes and no ball.

Exclusion: Find the girl with a cat but no hat.

The number and distribution of attributes are such that each card can be identified by any one of the four constructions.

On the back of each card, part of a human face is drawn. The backs of the six cards combine to form a complete face when properly placed

in a puzzle frame that is provided for each child. The three sets of cards have different funny cartoon faces on the backs (see Fig. 2).

After the experimenter reads a defining sentence, each of the three children picks up the correct card from the six cards placed in front of him. The first card is turned over and fitted into the bottom space on the puzzle frame. The next defining sentence is read and each child picks up the correct card and fits it into the second space on the puzzle frame. This procedure is continued until all six cards have been chosen and each child has completed his own cartoon face in the puzzle frame.

The four middle pieces of the face puzzle can be inserted into the puzzle in two positions. For example, one of the mouth cards appears happy in one position, sad in the other. A variety of expressions is therefore possible with one set of cards. By interchanging the piece from one set with a corresponding piece from another, a much greater variety of faces is made possible. As a result, the game provides a wide diversity of picture rewards for the child and constant surprises as to what kind of face will be formed.

Since the children respond together to one sentence at a time, the three faces are all formed at the same rate. The game is therefore non-competitive, and all three players share in the excitement of seeing three faces appear.

After the faces have been completed, the cards are removed, turned over, and sorted into three sets of six cards to begin another round. A different set of defining sentences can be used for each round.

Subjects: The subjects were eight children aged 4 years 3 months to 5 years, enrolled in a Head Start class. Five of the children were black, the others Mexican-American or Caucasian.

Pretest: Children were tested individually by the experimenter in an office nest to the classroom. Each child was shown six pictures on a large sheet, each depicting a boy or a girl characterized by different familiar attributes. Each child was asked to point to pictures described by defining sentences using conjunction, negation, joint denial, and exclusion. A record was kept of which picture was selected. Twenty-two questions were asked, and the children were scored for the number correct.

Procedure: On each of four days, children were brought into the office in groups of three, and played the game for 15 or 20 minutes each day. Six of the children had four game sessions; two had only three sessions, because of absence. In each session, three or four rounds of the game were played. On each successive day the game was played at a more difficult level. On the first day, after a few defining sentences using simple affirmation were given, e.g. "the girl with the hat", to teach the method of play and assure knowledge of the attributes, sentences using conjunction were introduced. On the second day, defining sentences using conjunction were reviewed, and defining sentences using negation were presented. On the third day, conjunction and negation were reviewed and joint denial introduced. On the fourth day, the preceding constructions were reviewed and exclusion was introduced.

If a child could not select the correct card, the clue was repeated. If he picked up the wrong card, the experimenter helped with an explanatory remark; for example, "That boy has shoes. Find a boy with a ball and no shoes." If a child was still unable to find the correct card, one of the other players was asked to help.

Posttest: The next day, the children were individually given two posttests: the first was identical to the pretest; the second was a transfer test and contained identical linguistic constructions but used a new picture, showing six children as before, but with different attributes.

RESULTS

Scores on the pretest, posttest, and transfer test are shown in Table 1. Seven of the eight children showed a gain on the first posttest. Those with the lowest pretest scores showed the most dramatic gains; see especially subjects A, D, and H. All but one child did better on the transfer test than on the pretest. ($t = 2.99$; $p < .05$)

No objective measurement was made of the subject's enjoyment of the game. However, the experimenter observed that the children almost invariably asked to repeat the game after each round. They seemed very amused and interested in the cartoon faces. In the mornings when the experimenter arrived at the classroom, several children would run up and ask to be allowed to play. This may of course be attributed to the novelty of the game, lack of interest with the on-going classroom activities, or rapport established by the experimenter; but clearly the game was an activity that the children enjoyed.

DISCUSSION

Cognitive outcomes: The children clearly improved in oral comprehension of the four linguistic constructions presented in the game format. The children who did most poorly on the pretest showed the most improvement. Thus the game does not seem to benfit greatly the child who already has a grasp of the constructions.

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A number of factors may contribute to the improvement in scores. The higher posttest scores may have been due to increased motivation to do well in order to please the instructor as rapport was established. Impulsivity may have been brought under control by the need to select and pick up a specific card, knowing that only the correct card would make the next part of the face. The pretest required only pointing, and some children appeared to point randomly whenever the correct answer was not immediately obvious to them.

Another factor, not measured objectively but observed by the experimenter, was that of level of confidence. During the pretest, some of the children seemed to feel that it was not even worth trying to find the correct picture for the longer defining sentences. While playing the game, they may have learned that if they paid attention, they could find the correct card and make the funny face like the other children. Thus they may have gained confidence for the posttests.

Affective outcomes The children were observed to enjoy the game and ask to play again. This seems significant in view of the fact that the task involved has no intrinsic interest to the children. One of the basis problems in teaching cognitive skills to young children is keeping them interested in the task. The reinforcement used is therefore an important element in teaching young children specific skills. The process of forming a cartoon face was clearly fun for the children; in order to accomplish this they were willing to listen carefully to difficult linguistic constructions and try to find the correct card. This type of reinforcement could be used in the teaching of many different cognitive skills.

Game variables: The children had no trouble in following the directions and understanding what they were supposed to do. Fitting the parts of the face into the puzzle frame took some practice, but most children were able to do this by the second or third round of the game. The children apparently already had some experience in working the usual picture puzzles so that the task was not completely new to them.

The children handled the materials appropriately for the most part, but they tended to pick up the pieces and fiddle with them when they were not responding to a particular sentence. Some children wanted to get ahead of the game by picking up and fitting in cards before they were called for. In order to minimize the need for adult supervision, a game for this age group would probably be more successful with fewer loose pieces.

It was found that 15 to 20 minutes is an appropriate length for each game session, since the children maintained interest and often asked to repeat the game. The interest was also sustained over the four days of the study. During the period of play all the children are actively involved, since each child must respond to every sentence. This avoids the problem, noted in preliminary studies, of requiring each child to wait his turn while two or three others play.

CONCLUSIONS

This pilot study indicated that children can improve oral comprehension of certain linguistic constructions through the use of the game described. They also enjoy playing the game. The game approach would seem to be an appropriate way to teach cognitive skills to young children, since an activity that is fun for them can keep them at a task that is not intrinsically interesting.

Table 1. Scores on Pretest, Posttest, and Transfer by Individual Children

	X	Y	Z
SUBJECT	PRETEST	POSTTEST I	TRANSFER
A	7	17	20
B	15	17	19
C	19	18	20
D	9	17	13
E	15	16	17
F	16	17	19
G	10	15	16
H	7	14	21
	12.25	16.375*	18.125

*p < .05